Intensification of maize cultivation: impacts of climate, soils fertility and prices in Northern Cameroon

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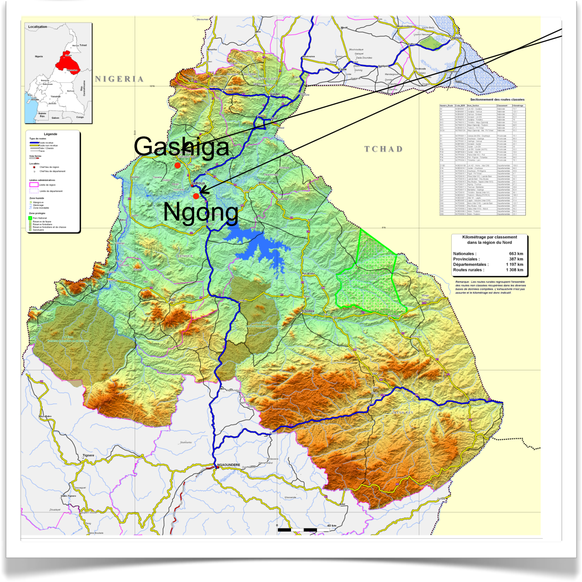
The current low yields on subsistence crops in sub-Saharan Africa are in opposition to the challenges assigned to agriculture: feed the world, provide alternatives to fossil fuels and deliver environmental services.

Crop intensification appears a necessity. But is it currently profitable?

Summary

Soils degradation is the factor that most affects the profitability of crop management on maize cultivation in Northern Cameroon and reduces the interest of their intensification. It is also affected by severe weather conditions but mainly by low valuation of agricultural products. Maize cultivation intensification is only possible with the help of a seasonal credit system to acquire inputs. The use of casual hired labor and an increase in the purchase price of corn are other conditions that will favor its implementation.

Materials and methods

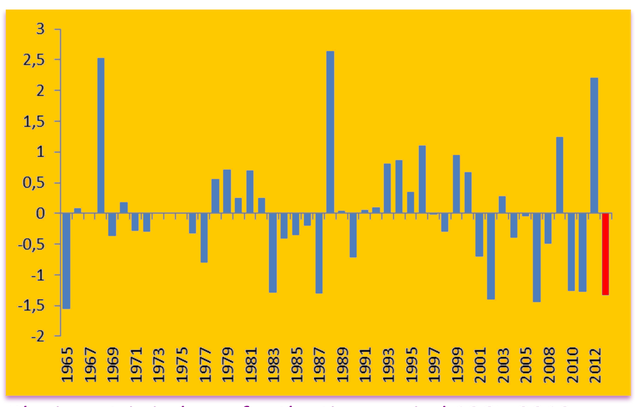


Location of the sites of study, Gashiga and Ngong.

The study consisted in 2013 to test three levels of intensification, 2 repetitions, on 35 producing fields declared fertile for half of them, and degraded for the other half (according to the holders) on two sites in northern Cameroon.

The soils of the two sites are tropical ferruginous soils. The pluviometry on both sites was mixed and mediocre in general: 691 mm at Ngong and 800 mm at Gashiga. Thus, one of the worst years since 1965.

The 3 levels of intensification studied are plots of land held and cultivated by smallholders, without intervention, the first level of intensification (NI1) corresponds to the datasheet of maize cultivation currently popularized, the second level of intensification (NI2) corresponds to that with selected seeds, seeds treatment, better crop density, strengthening of mineral fertilizers, organic manures, strengthening the fight against weeds.



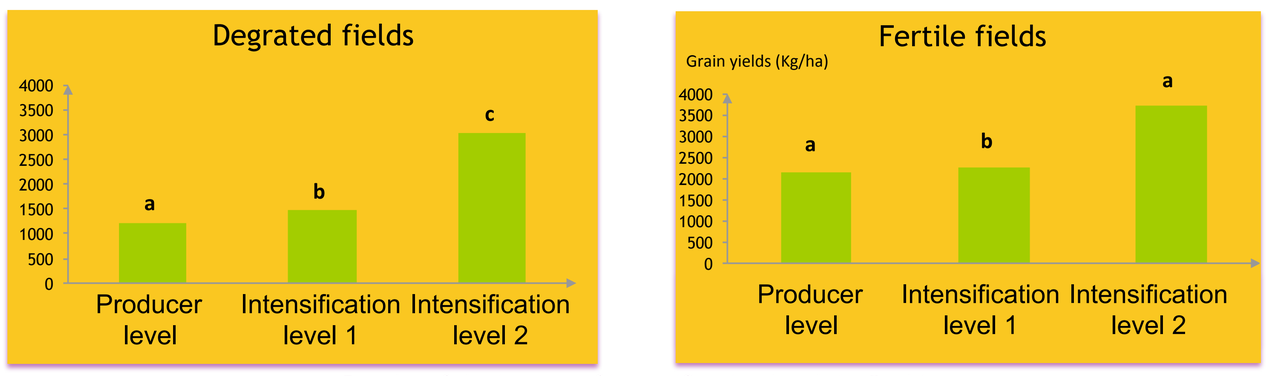
Pluviometric indexes for the time period 1965-2013. Ngong (the data of the 1967s, 1973s, 1974s and 1975s are missing).

Results

Ngong site test.

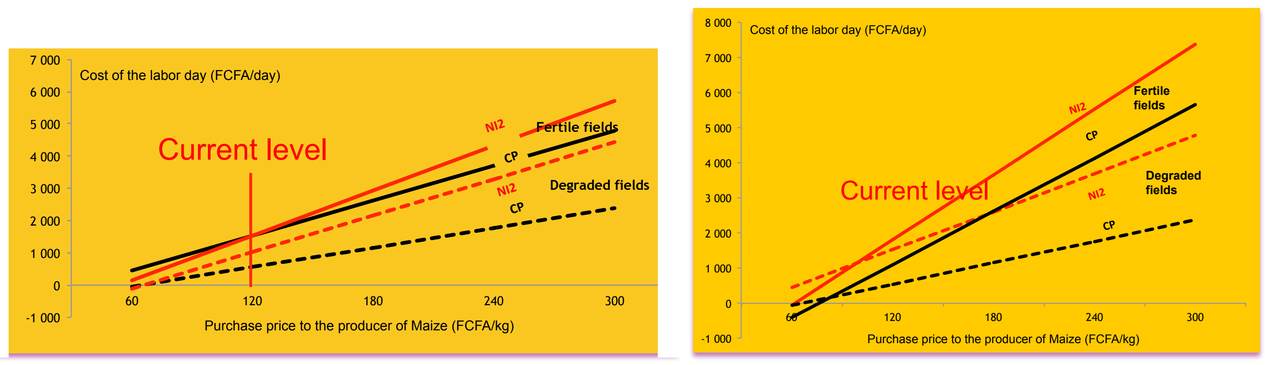
The regressions operated on the 210 plots of land reveal an effect of the site (-717 kg / ha for the site of Ngong, the driest), of the fertility of fields (+591 kg / ha for the fertile fields), and of some cropping states (striga, grassing, density of crop).

The grouping analysis reveal four homogeneous groups of fields: the fertile plots and the degraded plots on both sites. The intensification of maize cultivation results in a yield increase of 1 to 1.5t/ha in Ngong and Gashiga respectively.



Results of the impact of intensification levels in Gashiga.

Simulations of price developments show that the intensification becomes the most profitable strategy in the context of Gashiga when additional works are performed by use of hired labor, but less profitable in the context of Ngong.



Economic simulation in Gashiga. Without (on the right) and with (left) Use of external hired labor.

Discussion

Despite the technical results, the economic interest of the intensification of maize cultivation is not evident in conditions of low rainfall, low soil fertility or low valuation of the product. High input costs (multiplied by 2.6) require a seasonal credits system to be set.

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